



United Kingdom of Great Britain and Northern Ireland

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BS NA EN 1994-2 (2005) (English): UK National Annex to Eurocode 4. Design of composite steel and concrete structures. General rules and rules for bridges

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NATIONAL ANNEX

UK National Annex to Eurocode 4: Design of composite steel and concrete structures –

Part 2: General rules and rules for bridges

ICS 91.010.30; 91.080.10; 91.080.40; 93.040

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National Annex (informative) to BS EN 1994-2:2005, Eurocode 4: Design of composite steel and concrete structures – Part 2: General rules and rules for bridges

Introduction

This National Annex has been prepared by BSI Subcommittee B/525/4, *Composite structures*. In the UK it is to be used in conjunction with BS EN 1994-2:2005.

NA.1 Scope

This National Annex gives:

- a) the UK decisions for the Nationally Determined Parameters:
 - 1) in the general rules described in the following subclauses of BS EN 1994-2:2005, which come from BS EN 1994-1-1:2004:
 - 2.4.1.1 (1)
 - 2.4.1.2 (5)P
 - 6.6.3.1 (1)
 - 2) in the specific rules for bridges described in the following subclauses of BS EN 1994-2:2005:

• 1.1.3 (3)	• 6.6.1.1 (13)
• 2.4.1.2 (6)P	• 6.8.1 (3)
• 5.4.4 (1)	• 6.8.2 (1)
• 6.2.1.5 (9)	• 7.4.1 (4)
• 6.2.2.5 (3)	• 7.4.1 (6)
• 6.3.1 (1)	• 8.4.3 (3)

NOTE See foreword to EN 1994-2:2005.

- b) the UK decision on the status of BS EN 1994-2:2005, informative Annex C; and
- c) references to non-contradictory complementary information.

NA.2 Nationally Determined Parameters

NA.2.1 Reference to guidance for shear connectors other than welded headed studs [BS EN 1994-2:2005, 1.1.3 (3)]

Guidance for shear connectors other than welded headed studs is given in PD 6696-2.

**NA.2.2 Partial factor for pre-stressing action, γ_p
[BS EN 1994-2:2005, 2.4.1.1 (1)]**

The partial factor for pre-stressing action, γ_p , should be 1,0 for favourable and unfavourable effects, as recommended in BS EN 1994-2.

**NA.2.3 Partial factor for design shear resistance of a headed stud, γ_v
[BS EN 1994-2:2005, 2.4.1.2 (5)P]**

The partial factor for design shear resistance of a headed stud, γ_v , should be 1,25 as recommended in BS EN 1994-2.

NA.2.4 Partial factor for fatigue strength of studs in shear, $\gamma_{Mf,s}$ [BS EN 1994-2:2005, 2.4.1.2 (6)P]

The partial factor for fatigue strength of studs in shear, $\gamma_{Mf,s}$, should be 1,0 as recommended in BS EN 1994-2.

NA.2.5 Combination factor for global and local action effects [BS EN 1994-2:2005, 5.4.4 (1)]

The combination factor for global and local action effects for bridges except road bridges should be 1,0.

The combination factor for global and local action effects for road bridges is stated to be a nationally determined parameter in BS EN 1993-2:2006, E.2. The value for this parameter should be as recommended in the National Annex to BS EN 1993-2:2006¹⁾.

**NA.2.6 Choice of the methods for calculating elastic resistance to bending
[BS EN 1994-2:2005, 6.2.1.5 (9)]**

In calculating the elastic resistance to bending, the method given in BS EN 1994-2:2005, 6.2.1.5 (7) and (8) or the method given in BS EN 1993-1-5:2006, Section 10 may be used.

NA.2.7 Values of $C_{Rd,c}$ and k_1 for concrete flanges in tension [BS EN 1994-2:2005, 6.2.2.5 (3)]

The value of the coefficient $C_{Rd,c}$ should be $0,15/\gamma_c$ as recommended in BS EN 1994-2.

The value of the coefficient k_1 should be 0,12 as recommended in BS EN 1994-2.

**NA.2.8 Reference to rules for transverse filler beams
[BS EN 1994-2:2005, 6.3.1 (1)]**

Rules for transverse filler beams are given in PD 6696-2.

¹⁾ In preparation.

NA.2.9 Shear connection

[BS EN 1994-2:2005, 6.6.1.1 (13)]

No reference is provided to further guidance on considering the effects of bending moments at the steel-concrete interface, about an axis parallel to the axis of the steel beam, caused by deformations of the slab or the steel member, adjacent to cross frames and vertical web stiffeners, and for composite box girders.

NA.2.10 Partial factor for design shear resistance of a headed stud, γ_V [BS EN 1994-2:2005, 6.6.3.1 (1)]

The partial factor for design shear resistance of a headed stud, γ_V , should be 1,25 as recommended in BS EN 1994-2.

NA.2.11 Reduction factor for the shear resistance of a stud connector, k_s [BS EN 1994-2:2005, 6.8.1 (3)]

The reduction factor for the shear resistance of a stud connector, k_s , should be 0,75 as recommended in BS EN 1994-2.

NA.2.12 Partial factor for fatigue strength of studs in shear, $\gamma_{Mf,s}$ [BS EN 1994-2:2005, 6.8.2 (1)]

The partial factor for fatigue strength of studs in shear, $\gamma_{Mf,s}$, should be 1,0 as recommended in BS EN 1994-2:2005, 2.4.1.2 (6)P.

NA.2.13 Design value of crack width, w_k , and the combination of actions [BS EN 1994-2:2005, 7.4.1 (4)]

The value of w_k , which should be taken as w_{max} , and the combination of actions, are stated to be nationally determined parameters in BS EN 1992-2:2005, 7.3.1 (105). These parameters should be as recommended in the National Annex to BS EN 1992-2:2005.

NA.2.14 Specific measures to limit the heat of hydration of cement and the temperature difference to be considered [BS EN 1994-2:2005, 7.4.1 (6)]

Specific measures to limit the heat of hydration of cement may be described in a project specification together with the temperature difference to be considered. If no specific measures to limit the heat of hydration of cement are described in the project specification then the temperature difference to be considered should be 25 K.

NA.2.15 Shear connection and transverse reinforcement [BS EN 1994-2:2005, 8.4.3 (3)]

No reference is provided to information describing the provision of reinforcement near shear connectors arranged in groups to prevent premature local failure in either the precast or the in situ concrete.

NA.3 Decision on the status of informative annexes [BS EN 1994-2:2005, Annex C, Headed studs that cause splitting forces in the direction of the slab thickness]

BS EN 1994-2:2005, Annex C should be used.

NA.4 References to non-contradictory complementary information

Non-contradictory complementary information for use with BS EN 1994-2 is given in PD 6696-2.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS EN 1992-2:2005, *Eurocode 2 – Design of concrete structures – Part 2: Concrete bridges – Design and detailing rules*

BS EN 1993-1-5:2006, *Eurocode 3 – Design of steel structures – Part 1-5: Plated structural elements*

BS EN 1993-2:2006, *Eurocode 3 – Design of steel structures – Part 2: Steel bridges*

BS EN 1994-1-1:2004, *Eurocode 4 – Design of composite steel and concrete structures – General rules and rules for buildings*

National Annex to BS EN 1992-2:2005: *UK National Annex to Eurocode 2 – Design of concrete structures – Part 2: Concrete bridges – Design and detailing rules*

National Annex to BS EN 1993-2:2006²⁾. *UK National Annex to Eurocode 3 – Design of steel structures – Part 2: Steel bridges*

PD 6696-2:2007, *Background paper to BS EN 1994-2 and the UK National Annex to BS EN 1994-2*

²⁾ In preparation.

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